IN THE CLAIMS

We claim:

1. A method, comprising:

providing a substrate having a metal portion; and

forming a metal capping layer on the metal portion, the metal capping layer comprising a group VIII metal and an element comprising at least Si, N, or C.

2. The method of claim 1, wherein the group VIII metal is cobalt.

3. The method of claim 1, wherein the metal capping layer further comprises a refractory metal.

4. The method of claim 1, further comprising forming the metal capping layer on the metal portion by applying an electroless plating solution to the metal portion of the substrate.

5. The method of claim 4, wherein the electroless plating solution is applied to the metal portion for a time sufficient to form a metal capping layer having a thickness in the approximate range of 50 angstroms and 200 angstroms.

6. The method of claim 1, wherein forming a metal capping layer on a metal portion comprises forming a metal capping layer on a copper interconnect line.

7. A method comprising:

providing a substrate having a metal portion; and

forming a metal capping layer on the metal portion, the metal capping layer comprising a group VIII metal; and

incorporating an element comprising at least Si, N, or C by a plasma enhanced chemical vapor deposition treatment of the metal capping layer after forming the metal capping layer on the metal portion.

8. The method of claim 7, wherein Si is incorporated into the metal capping layer by the plasma enhanced chemical vapor deposition of a silane.

9. The method of claim 7, wherein the metal portion is copper.

10. A composition, comprising:

a group VIII metal; and

an element comprising at least Si, N, or C.

11. The composition of claim 10, wherein the group VIII metal is cobalt.

12. The composition of claim 10, wherein the group VIII metal is present in the composition in the approximate range of 60 atomic percent and 95 atomic percent.

13. The composition of claim 10, wherein the group VIII metal is alloyed with at least a second metal.

14. The composition of claim 13, wherein the second metal is a group VIIB refractory metal that is present in the composition in the approximate range of zero atomic percent and 20 atomic percent.

15. The composition of claim 1, wherein the element comprising at least Si, N, or C is present in the composition in the approximate range of 1 atomic percent and 10 atomic percent.

16. The composition of claim 14, wherein the second metal is a group VIB refractory metal that is present in the composition in the approximate range of zero atomic percent and 20 atomic percent.

17. The composition of claim 1, further comprising boron that is present in the composition in the approximate range of zero atomic percent and 10 atomic percent.

18. The composition of claim 1, further comprising phosphorous that is present in the composition in the approximate range of zero atomic percent and 20 atomic percent.

19. An electroless plating solution, comprising:

a group VIII refractory metal containing compound;

a low molecular weight compound containing an element comprising at least Si, N, or C;

a complexing agent;

a buffer agent;

a pH adjuster.

20. The solution of claim 19, wherein the group VIII refractory metal containing compound also contains ammonia.

21. The solution of claim 19, wherein the group VIII refractory metal containing compound is a salt of the group VIII refractory metal.

22. The solution of claim 19, wherein the low molecular weight molecule containing nitrogen is hydrazine hydrite.

23. The solution of claim 19, wherein the low molecular weight carbon containing compound is glycine.

24. The method of claim 19, further comprising a reducing agent.

25. A method comprising:

increasing a recrystallization temperature of a composition containing a group VIII metal by adding an element comprising at least Si, N, or C to the composition.

26. The method of claim 25, wherein increasing the recrystallization temperature further comprises adding a refractory metal to the composition.

27. The method of claim 25, wherein increasing the recrystallization temperature further comprises adding an element selected from the group consisting of boron and phosphorous to the composition.

28. An apparatus, comprising:

a metal interconnect line within a dielectric layer; and

a metal capping layer formed above the metal interconnect line, the metal capping layer comprising a group VIII refractory metal and an element comprising at least Si, C, or N.

29. The apparatus of claim 28, wherein the metal interconnect line is copper.

30. The apparatus of claim 28, wherein the metal capping layer has a thickness in the approximate range of 50 angstroms and 200 angstroms.